*Citation for published version:*
Turner, N, Swart, J, Maylor, H & Antonacopoulou, E 2016, 'Making it happen: how managerial actions enable project-based ambidexterity', *Management Learning*, vol. 47, no. 2, pp. 199-222. https://doi.org/10.1177/1350507615610028

*DOI:*
10.1177/1350507615610028

*Publication date:*
2016

*Document Version*
Early version, also known as pre-print

Link to publication

Turner, N., Swart, J., Maylor, H., & Antonacopoulou, E. (2016). Making it happen: How managerial actions enable project-based ambidexterity. Management Learning, 47(2), 199–222. Copyright © 2015 The Authors. Reprinted by permission of SAGE Publications.

**University of Bath**

## Alternative formats
If you require this document in an alternative format, please contact:
openaccess@bath.ac.uk

**General rights**
Copyright and moral rights for the publications made accessible in the public portal are retained by the authors and/or other copyright owners and it is a condition of accessing publications that users recognise and abide by the legal requirements associated with these rights.

**Take down policy**
If you believe that this document breaches copyright please contact us providing details, and we will remove access to the work immediately and investigate your claim.

Download date: 05. May. 2023

# *Making it happen: how managerial actions enable project-based ambidexterity.*


## Abstract

The literature on ambidexterity is dominated by theoretical development and does not fully explain how ambidexterity is enacted. There is limited focus on the managerial actions in day-to-day operations that enable this important phenomenon. We posit that projects offer an ideal context to investigate the actions that enable ambidexterity, since they necessarily combine planning and control (exploitation) with some degree of novelty (exploration). Using extensive data from eight project-based case studies in the IT-services sector, we ask the research question: *How is project-based ambidexterity enabled?* Within this context we identify two different types of project-based ambidexterity (‘*distributed’* and ‘*point’* ambidexterity) and five managerial actions (‘*buffering’, ‘gap-filling’, ‘integration’, ‘role-expansion’,* and *‘tone-setting’*) that enable ambidexterity. We investigate the underlying resource utilisation in terms of intellectual capital (namely human, social and project capital) and show the complexity of their interplay in achieving ambidexterity. Finally, we develop a model that brings these concepts together and identify how the ‘integration’ function is central to, and interwoven with, the other actions.



## Keywords

Project-based ambidexterity, intellectual capital, managerial actions, case study.

## Introduction

There is increasing scholarly interest in the subject of *ambidexterity* (Raisch and Birkinshaw, 2008; Simsek, 2009), whereby firms may achieve both exploitation and exploration (March, 1991). Previous work has identified the benefits of this attainment on business performance (e.g. He and Wong, 2004; Katila and Ahuja, 2002; Morgan and Berthon, 2008) and firm longevity (O'Reilly and Tushman, 2011), and recent reviews support this (Birkinshaw and Gupta, 2013; Junni et al., 2013; O'Reilly and Tushman 2013; Turner et al., 2013).

The literature suggests three major forms of ambidexterity. In *temporal* ambidexterity (Tushman and O'Reilly, 1996), exploitation and exploration are separated in time, with the organisation moving from one dominant theme to the other (see also Swart and Kinnie, 2007). *Structural* ambidexterity (O'Reilly and Tushman, 2004) requires that these modes are separated, with one organisational unit focusing on exploitation, another on exploration, with both integrated at the senior management level. Gibson and Birkinshaw (2004) identify business unit level *contextual* ambidexterity whereby the choices made by individuals allow both alignment (coherent business activities working towards a common goal – exploitation) and adaptability (the capacity to reconfigure those activities as required by the task environment – exploration). There is, however, a lack of theorisation in more complicated organisational structures, where heterogeneous sub-units (for example, different domains, departments, or specialities) interact (Benner and Tushman, 2003).

A systematic review by Turner et al. (2013) showed that analysis at the individual level is sparse, and that the literature does not fully explore the detailed actions by which managers may achieve ambidexterity. This is reinforced by O'Reilly and Tushman (2011:8), who argue "what is missing is a clear articulation of those specific managerial actions that facilitate the simultaneous pursuit of exploitation and exploration." The prominence of the ambidexterity

debate in both scholarly journals (Birkinshaw and Gupta, 2013) and practitioner-focused journals (e.g. O'Reilly and Tushman, 2011; Tushman et al., 2011) has led to calls for greater understanding of the mechanisms behind ambidexterity. Gibson and Birkinshaw (2004) advocate systematically examining the behaviours of senior executives in an effort to understand how they help create ambidexterity. Therefore, additional research is called for in order to develop a more fine-grained understanding of 'how ambidexterity may be achieved'. Specifically, Jansen et al. (2006) suggest in-depth studies to address how managers are triggered to change levels of exploratory and exploitative innovation; Kristal et al. (2010) advise longitudinal studies encompassing supply chains; Kuckerz et al. (2010) advocate further investigation of the interactions between exploitative and exploratory innovation and the role of ambidexterity in dynamic markets; and Lubatkin et al. (2006) suggest that researchers address the question of whether higher performance is sustainable in the face of changing competitive challenges coupled with limited resources. Turner et al. (2013) call for studies at the micro-level to understand the role and orchestration of organisational assets using qualitative, longitudinal, methods in both high- and low-novelty work, including discontinuities such as critical incidents, and we adopt this approach in our study. We also follow their approach in researching ambidexterity by looking at managerial actions in terms of intellectual capital.

The research reported in this paper responds directly to these calls. It adds to our knowledge of the subject by pinpointing the managerial actions that are used to enable ambidexterity within projects. This orientation is in line with the micro-foundations (Felin and Foss, 2005; Greve, 2013) perspective. In exploring ambidexterity, our focus is on the managerial actions and the social interactions that enable them. We show some of the conditions that make balancing exploitation and exploration so challenging and complex.

We address this limitation in the current literature by paying attention to the managerial actions and the context within which ambidexterity is likely to occur, together with the socio-political dynamics that influence those actions. Moreover, to ensure that we remain close to the action, we choose the project as an important contemporary organisational form (Eisenhardt and Tabrizi, 1995; Söderlund, 2011), and discuss the resources which enable or constrain managerial actions. We examine the resources being used to enable ambidexterity, drawing on the intellectual capital ambidexterity approach of Kang and Snell (2009) and Turner and Lee-Kelley (2013) which underpins our analysis. In line with this literature, our core research question was: *How is project-based ambidexterity enabled?*

### *The locus of ambidexterity: projects*

Ambidexterity has been studied in a wide range of industries, geographical locations and organisational contexts. However, it is notable that the authors often do not provide a clear rationale as to why their specific research design is particularly suitable to investigate this phenomenon. We focus on the context of projects, as this offers insight into ambidexterity in contemporary organisational forms. Projects are temporary organisational forms within an organisation and generally follow standardised industry or firm-specific processes (i.e. exploitation), yet all are necessarily, to some extent, unique (i.e. require an exploratory, problem-solving, approach to generate new knowledge) (Geraldi et al., 2011b). Projects represent a prominent organisational form within which both exploitation and exploration occur and are therefore highly suitable as a context for study. Much valuable research has been undertaken looking at projects in terms of learning (Arthur et al., 2001; Ayas and Zeniuk, 2001; Garrick and Clegg, 2001; Keegan and Turner, 2001; Scarbrough et al., 2004; Smith, 2001; Swan et al., 2010), and knowledge transfer and integration (Cacciatori et al., 2012; Enberg et al., 2006; Newell et al., 2006), and this provides the foundation for the work that follows.

There is a growing body of research on projects as appropriate units of analysis to study complex interactions (Davies and Hobday, 2005; Maylor et al., 2006; Söderlund, 2011), including the consideration of exploitative and exploratory aspects in these temporary organisations. Klein and Meckling (1958) distinguish between an 'optimizer' and 'skeptical' approach in major defence development projects. In the first, a clear path to the end product is defined and executed at the outset (more exploitative). If the choices made are correct, then this is indeed the most efficient route to take. However, the uncertainties at the beginning mean that a more exploratory (skeptical) approach may actually be more suitable. This involves keeping options open as long as possible and trialling alternative solutions to find the most effective. Klein and Meckling (1958) advocate that this may, in fact, be the superior route to take (see also Brady et. al, 2012). A similar approach is taken by Lenfle and Loch (2010), who look at the history of project management from the 1950s to the present day and argue that an emphasis on planning and control have diminished the opportunities for novelty and trials of uncertain solutions. Eisenhardt and Tabrizi (1995) show that in the computer industry an experiential approach of improvisation, flexibility and multiple design options is effective under conditions of uncertainty, whereas a 'compression' strategy of overlapping phases requires more certainty and maturity. These broadly correspond to exploratory and exploitative approaches, respectively. Lindkvist et al. (1998) discuss high-technology projects and the twin requirements of generating new knowledge while also controlling the work within given constraints. These can involve 'systemic' processes where tasks are hard to specify in advance, together with deep, exploratory, problem-solving requirements using multiple specialists. Situations such as these may benefit from an ambidextrous approach, yet this is far from straightforward (e.g. Maylor et al., 2013). This is further developed by Lindkvist (2012) who focuses on knowledge integration using cases from the telecoms and pharmaceutical industries. The former is (broadly) exploitative, with clearer targets and a more straightforward ability to detect and correct errors; the latter is more exploratory since

drug development is inherently uncertain and cannot readily be achieved using explicit goals, so this context requires greater fundamental problem-solving. Projects are therefore a logical organisational area in which to investigate ambidexterity since there is a need to balance exploitation and exploration, albeit that in different pieces of work one approach may be more prevalent than the other.

Davies and Brady (2000) refer to the benefits of 'economies of repetition' as findings from one piece of work can be utilised on future projects, and Brady and Davies (2004) show how organisations can learn through 'vanguard' projects (exploration), then refine this knowledge over time and exploit it into a systematic approach to project operations (exploitation). Researchers have also investigated the implications of managing projects where neither the goals nor methods are well-defined (e.g. Lenfle, 2008, 2014; Turner and Cochrane, 1993), and how project learning can change the dominant design in an industry (e.g. Midler and Beaume, 2010). Grabher and Ibert (2012) take an 'ecology' view of the temporary organisation, looking at multiple levels, from the individual to the wider community outside the firm. Using two case studies they distinguish between a 'cumulative' ecology (software) which can be considered as predominately exploitative, and a 'disruptive' one (advertising), with more exploratory characteristics. They compare the distinctions at the core team, firm, epistemic community and personal network levels (2012:191). These works, though, focus primarily at the organisational level. This is valuable in understanding the implications of exploitation and exploration in this context, yet can be considered as more representative of temporal or structural representations of ambidexterity. There is currently only limited investigation of the detailed managerial actions by which ambidextrous learning can be enabled, and the contextual ambidexterity view that we sought to investigate is comparatively under-researched.

Exploitation and exploration has, then, been a subject of great interest to project scholars. Much of the learning research to date has been at the project or organisational level, although recent work has also studied this at the programme level (Dutton et al., 2014; Pelligrinelli et al., 2015). Some have looked at the corresponding micro-level processes (Tiwana, 2008; Turner and Lee-Kelley, 2013), although this has not been a major focus and our understanding is still relatively limited. To answer our research question, we sought to understand both the actions being undertaken by managers and the resources being utilised.

### *The resources that underpin ambidexterity: intellectual capital*

We adopt an intellectual capital (IC) framework (e.g. Reed et al., 2006; Youndt et al., 2004) to guide our analysis because it is appropriately focused on resources which the project managers deploy. That is, they draw on resources which are knowledge-based to enable ambidexterity. This approach is central to our qualitative analysis of managerial actions.

Multiple definitions of IC have been proposed (Hsu and Wang, 2012; Swart, 2006), and we build upon the concepts of Kang and Snell (2009) who consider key subcomponents of IC in terms of ambidexterity. They decompose IC into *human capital* (HC, the tacit and explicit knowledge within individuals), *social capital* (SC, the knowledge embedded in personal relationships) and *organisational capital* (OC, methods, procedures, routines, and explicit knowledge). Importantly, Kang and Snell (2009) advise that each of these can be understood with both exploitative and exploratory aspects, and this allows these knowledge resources to be identified and analysed with respect to their contribution to exploitation and exploration.

Kang and Snell (2009) argue that the exploitative aspect of human capital can be understood as *specialist* knowledge. This may be, for example, detailed and extensive technical expertise, i.e. it is personal proficiency that can be drawn upon and refined. The alternative is

exploratory human capital which they term *generalist*, such as wide-ranging experience in general management roles (leading to, for example, a solid working knowledge of marketing, operations, finance, HR and so forth so that this familiarity enables an effective overview of the 'big picture' of the work), emphasising breadth over depth. Intangible resources such as the knowledge, skills and experience of engineers and managers will also have a great impact on the achievement of ambidexterity. These aspects necessarily reside in the heads of individuals (Bontis, 1998; Hedberg, 1981; Simon, 1991). A similar line can be taken to social capital. Kang and Snell (2009) posit that an exploitative approach uses dense social networks, for example, established teams with strong ties that are capable of sharing complex knowledge effectively. They label this *cooperative* social capital. They argue that the alternative exploratory approach can be thought of as drawing on a wider range of weaker ties to seek new knowledge (Burt, 1992; Erhardt, 2011; Granovetter, 1973; Hansen, 1999; Kauppila et al., 2011; Reagans and McEvily, 2003; Uzzi, 1997) and they term this *entrepreneurial* social capital. Finally, organisational capital, in which organisational knowledge is preserved (Daft and Weick, 1984; Holmqvist, 2009) can be *mechanistic* (such as well-defined and controlled organisational processes and systems), or *organic* (supporting flexibility and creativity in generating solutions) in nature (Burns and Stalker, 1961). Note that in the client/supplier context of the projects in which we collected data, organisational capital is a limiting concept and so we developed the more appropriate concept of *project capital* (PC) which we define as:

'Project capital': the existing organisational-level IC, together with the formal and informal processes that operate within the boundary of the project.

This approach is supported in the literature since knowledge can reside in the network of interacting firms (Kogut and Zander, 1996). Gulati et al. (2000) extend the resource-based view to incorporate "network resources" (2000:207), and Simsek (2009:605-6) also argues that "[w]hile OA [organisational ambidexterity] has not been related to interfirm-level

analysis to date, the notion that network ties are a key vehicle for both exploitation and exploration is the basis for an important stream of research."

We therefore investigate ambidexterity at multiple levels. This has been approached in several ways by scholars. Birkinshaw and Gupta (2013) identify 'nested' ambidexterity whereby exploitation and exploration exist at multiple levels of the organisation simultaneously, and Chang (2015) has recently looked at ambidexterity at the both the unit and firm level. Simsek (2009) develops a model in which he conceptualises organisational ambidexterity influenced by organisational, inter-firm, and environment factors and, importantly, by the interplay of these levels. Our approach has been based on Turner et al.'s (2013:323) argument that the lack of "multi-domain analysis of ambidexterity is limiting our understanding of the concept". This work is therefore in line with Kang and Snell (2009) who offer insight into how ambidexterity may be enabled by multiple aspects of intellectual capital, and Turner and Lee-Kelley (2013) who consider how these may interact. Taking this approach using identified organisational resources helps us understand better the 'how' of ambidexterity and gain greater insight into the means by which managerial actions using these resources can enable ambidexterity at the level of the project.

Turner and Lee-Kelley (2013) use the subcomponents of IC as a basis of investigating how project management can be considered in terms of ambidexterity. Through interviews, they identify that managers exhibited all six of these characteristics (i.e. both specialist and generalist knowledge, strong and weak ties in their networks, and ability to manage projects using both a planning and control approach, while also accommodating a more flexible style when necessary). This is summarised in Table 1, for clarity. It reinforces the coexistence of both exploitation and exploration (Cao et al., 2009; Gupta et al., 2006) and further supports the argument for using projects as a suitable environment in which to investigate ambidexterity.

INSERT TABLE 1 ABOUT HERE

## Method and Analysis

Our research method was to use interviews with managers. This qualitative approach involving multiple cases was intended to unpick the richness of their actions to enable a better understanding of ambidexterity. The research was undertaken within the IT-services division of a large multinational high-technology company. This division has approximately 50,000 staff, 15,000 of which are in the UK where the cases were based. The services arm provides a wide range of IT infrastructure and application development, business process management and other outsourced services to commercial corporations and public sector bodies.

To provide purposive sampling, the Company database of recent and current projects was used. UK-based (for ease of access), recently-completed or currently-completing projects were targeted, with a duration of 9 to 18 months to allow recollection over the length of the work. These criteria narrowed the potential number of projects from 682 to 52. These projects were assessed in terms of their *complexity* and *pattern of performance*. To determine the level of complexity, the five complexity dimensions from the systematic review by Geraldi et al. (2011a), namely *structural* (including technology, organisation and size), *uncertainty*, *dynamics*, *socio-political* and *pace* were used. These were evaluated by examining extensive documentation for each project and mapping the data against these dimensions. These data included the type of project and its degree of novelty, magnitude (budget and person-hours), risk (performance, staffing, client, and technology) and an assessment of the impact of the organisational politics. The projects were summarised as *higher* or *lower* complexity. The pattern of performance was established by comparing actual project performance to the initial

plan, and determining (based on extensive monthly metrics and their 'red/amber/green' reporting status) whether this was *smooth* or *uneven*. Therefore a simple 2x2 sampling framework was established. This research was based on a multi-case replication design with a number of conditions (Eisenhardt and Graebner, 2007; Yin, 2009, chap. 2) guided by our research focus (Eisenhardt, 1989). Eight case projects were selected and contacted to participate in the study, covering the finance (3), telecoms (2), healthcare (1), government services (1) and defence (1) sectors.

Multiple contexts were covered to minimise the chance that any industry-specific issues would impact upon the analysis and thus to ensure greater generalisability of the results. In these cases, many of the contracts were to take over the client IT function, under which circumstances the individuals interviewed as staff of the supplier had previously (even quite recently) been employees of the client. Hence their affiliation was often with their particular industry rather than with the case organisation as a whole and/or its other clients. For example, members of the healthcare and defence groups expressed little knowledge of each other's business.

All four elements of the complexity/performance grid were populated, with three cases in the high complexity / uneven performance quadrant, one in the low complexity / smooth performance quadrant (expected to have 'no surprises') and two in each of the others. This was intended to allow us to investigate any differences identified between the four areas of the grid. An indicative representation is shown in Figure 1, and these evaluations were reviewed with senior representatives from the case organisation.

INSERT FIGURE 1 ABOUT HERE

An interview protocol was designed to establish the 'story' of the project over the beginning, middle and end phases, and to identify any consistent themes amongst the cases. This included any critical incidents (Flanagan, 1954), the actions undertaken during them, and how this differed from 'intervening' (i.e. 'non-critical') periods. The intellectual capital elements and the nature of the exploitation and exploration processes were also identified within the project work. The boundary of the project included the interactions between organisations, and so in this case the area for research was defined by the activity within the project.

To enable a richer, triangulated, view of the project, at least three managers with different roles and a diversity of perceptions (Stake, 2006) were interviewed per case, to include the Project Manager, and positions such as Programme Manager (a more senior position, generally obtained from a project management background) and Project Management Office (PMO, often a support office concerned with adherence to organisational procedures) Manager. Their perspectives on ambidexterity offered a valuable insight, since the managerial role is an important aspect within the field (Cao et al., 2010; Jansen et al., 2008; Lubatkin et al., 2006; Mom et al., 2007, 2009; Nemanich and Vera, 2009), however multi-respondent qualitative cases are lacking. Between three and five managerial respondents were obtained per case, each interviewed individually (note that other managerial titles such as Technical Manager and Delivery Manager were also used, depending on the case). Interviews were performed face-to-face except five that had to be performed by telephone due to scheduling issues. The semi-structured interviews each took around an hour, and all were recorded and fully transcribed for analysis. The bulk of the analysis presented here was initially performed on the first seven cases, when theoretical saturation was achieved (Eisenhardt, 1989). The final case was to determine if any new insight was obtained, but no new themes were identified. A summary of the cases is given in Table 2.

INSERT TABLE 2 ABOUT HERE

Our intention was to use a three-stage analysis process to answer our research question. The first was to code the data to gain greater understanding of intellectual capital resource utilisation and to see if this differed between participants. The second was to use the cases to identify the key actions that managers undertook in order to generate ambidexterity. The final aspect was to understand how the actions identified could be understood in terms of the resources used.

The first stage of analysis was to code the transcript data in NVivo using an a priori coding scheme (the use of the intellectual capital subcomponents, plus exploitation and exploration) (Kang and Snell, 2009; March, 1991; Turner and Lee-Kelley, 2013), including the incorporation of concepts derived from previously-used survey instruments identified within the literature (primarily as sub-codes of the main coding scheme) (Im and Rai, 2008; Jansen et al., 2006; Ketkar and Sett, 2009; Li et al., 2008; Lubatkin et al., 2006; Morgan and Berthon, 2008; Nemanich and Vera, 2009; Tiwana, 2008). Other codes were used to identify project complexities, critical incidents and temporal aspects (the beginning, middle and end of the project). Each of the IC codes (HC, SC, PC) were prominent, with SC being marginally the most prevalent. Importantly, both exploitation and exploration were also strongly evident, indicating that project-based ambidexterity (i.e. the occurrence of both) could indeed be identified.

The cases and summaries of individual responses were written up in detail in order to understand the project, its context and the role of the managers within it. It became apparent during the analysis that this initial coding was not sufficient to explain the achievement of ambidexterity, and several key themes emerged from the data. These were developed as simple memos, notes and questions as the analysis progressed. To refine these emergent

themes, second-cycle pattern coding (Miles and Huberman, 1994:69-72; Saldaña, 2009:152-5) was performed to look for higher-level themes within the data. In comparing the responses of the interviewees, it became clear that a simple, single view of project-based ambidexterity was not sufficient. Two findings emerged from this analysis: first, an understanding of managerial configuration and context, leading to the identification of two different forms of enacted ambidexterity, and, second, the actions enabling ambidexterity.

We qualitatively mapped the managers' ambidexterity in terms of the factors within Table 1 in line with Turner and Lee-Kelley (2013). This is illustrated in Figure 2, whereby individuals could be mapped with regards to their exploitative and exploratory actions in terms of human, social and project capital. Individuals could be highly exploitative (e.g. a technical specialist working in a tight-knit team with a strong process-based approach), exploratory (far more of a generalist with a wide network of contacts, working flexibly to try new solutions), or a combination of these aspects. This was instructive as it allowed us to compare individuals within the same project, and also identify any interactions between them. Analysing the responses of the managers showed that within each project there were wide variations amongst individuals in terms of the resources that enable project-based ambidexterity. Mapping the responses provided a graphical representation of the differences. This is necessarily an incomplete conception, since various forms of specialism are required (project management knowledge, different forms of technical expertise, and so forth), but it is an informative method of representing the IC given a number of respondents. This is a representation of qualitative data, and is not intended as a quantitative analysis. However, it is a powerful graphical method for portraying ideas of how the elements enabling ambidexterity can be understood.

INSERT FIGURE 2 ABOUT HERE

As part of a second cycle of coding and the evaluation of the cases, we sought to identify the key managerial actions enabling the attainment of ambidexterity. We examined the data carefully in an attempt to classify the higher-level actions that the managers undertook. We labelled the actions as part of the analysis and then tried to bring these together into independent themes. By iterating between this analysis and the transcript data (Eisenhardt and Graebner, 2007), we arrived at five distinct themes to describe actions that were reported. This involved cross-case pattern-matching (Eisenhardt, 1989; Miles and Huberman, 1994:172-177; Yin, 2007:136-141). Following Miles and Huberman (1993:69) we used these 'pattern codes' as "explanatory or inferential codes, ones that identify an emergent theme, configuration, or explanation. They pull together a lot of material into a more meaningful and parsimonious unit of analysis. They are a sort of meta-code…. Pattern coding is a way of grouping these summaries into a smaller number of sets, themes or constructs… It reduces large amounts of data into a smaller number of analytic units." By asking 'what are the managers doing?', we repeatedly went through the data and our case write-ups in order to develop a higher-level understanding of the managerial actions. The research team discussed these labels and descriptions together with the case data until we were satisfied that we had extracted sufficient evidence from the transcripts and that the actions the respondents described could be accurately described by the themes. We labelled these 'buffering', 'gap-filling', 'integration', 'role-expansion' and 'tone-setting' (described in more detail later). Another emergent theme was that of the capacity and constraints within the project operations (including process requirements, budgets, timescales, and customer demands). This limited the practical range of available responses to situations (e.g. staff could not readily be brought in to help solve an issue, novel technical solutions were outside the scope of the project, and so forth).

We then used parallel-coding (King, 2004; Saldaña, 2009) of the data to identify the forms of intellectual capital associated with each action or combination of actions. The results of this are given in the next section.

Analysis of the coding data also enabled a detailed picture to be generated of the occurrence of two different types of ambidexterity ('distributed' and 'point', again described shortly) and the five actions. Although they were identified from examination of the cases primarily using a 'top-down' approach, specific instances were coded within the interview data.

Finally, we then analysed these results to identify relationships between the actions and identify the 'key' action which appears to be integral to the others.

## Findings

In this section we identify and explain two different types of ambidexterity, thereafter we present the specific managerial actions which enable ambidexterity. We also illustrate which intellectual capital resources enable these**.**

### *A rich picture: Two types of ambidexterity and their underpinning resources*

We now contrast two cases that offered greater insight into different types of ambidexterity, and how we identified this differentiation from the case data. The first example was from Case 1, the implementation of an IT system for a credit-card provider. The three respondents were the Project Manager, the Technical Manager, and the Delivery Assurance Manager. A graphical interpretation of the findings is given in Figure 3, based on Kang and Snell (2009) and extending the visual representation of Turner and Lee-Kelley (2013) to enable multiple respondents to be evaluated and compared. In terms of the human capital theorisation of

Kang and Snell (2009), the Project Manager (A in Figure 3) came from more of a generalist business background (exploratory, emphasising a broad knowledge of the business but not necessarily any deep expertise), and did not profess extensive technical proficiency, for that he relied on the Technical Manager (B) who was in charge of the technical delivery (more exploitative, relying on specialism). The Delivery Assurance Manager (C) focused primarily on ensuring compliance to the Company procedures, so was mostly exploitative. Between them, therefore, both exploitative and exploratory aspects of human capital were used (indicated by the dotted arrow to indicate the sum of the HC contributions).

In terms of social capital, Project Manager A worked closely with a wide range of client-side stakeholders as well as the internal delivery team to build relationships (i.e. both exploratory and exploitative SC), and Technical Manager B had similar contacts except they were the more technical staff. So although both exhibited ambidextrous SC, their actual contacts were generally different.

> "I was doing service delivery management, managing the support service whereas the PM [Project Manager] was exactly that, managing the project. And even after that, [named Project Manager], they did more on the relationship in terms of financials and legals and terms and conditions, whereas I was focusing more on the technical issues that were being reported and putting action plans in place to keep the system up and running." (Technical Manager, Case 1)

Delivery Assurance Manager C's contacts tended to be within the project in order to assess detailed delivery criteria (i.e. predominately exploitative). Finally, for PC, Project Manager A introduced more controlled processes into the work to enable smoother operation (exploitative) while also allowing operational flexibility when needed (exploratory). Managers B and C exhibited more mechanistic approaches to the work (albeit supported by

more exploratory problem-solving, as necessary), commensurate with the nature of their roles.

INSERT FIGURE 3 ABOUT HERE

To summarise, the three managers undertook quite different, though complementary, work, between them demonstrating aspects of both exploitation and exploration in all three categories of intellectual capital. Both exploitative and exploratory outcomes were coded (validating that project-based ambidexterity was achieved), however, notably, this was not achieved by any single individual in terms of their three IC subcomponents (HS, SC, PC). The ambidexterity was therefore 'distributed' among the participants, and this highlights why an overarching view of project-based exploitation and exploration could not readily be generated from a single respondent. The respondents' views were not generally consistent, on two counts. First, they were individually asked for their thoughts on the project complexity, and there was a tendency for each to focus on the importance of the aspect with which they were most involved. In the above example, the Project Manager (A) was mostly focused on structural coordination and the socio-political contractual issues, while the Technical Manager (B) was more involved with the detailed system performance issues, with the Delivery Assurance Manager (C) primarily concerned with compliance issues. Second, the critical incidents were also inconsistently reported. The Project Manager highlighted a major contractual issue with the client, the Technical Manager a significant technical challenge that had been overcome – they did not mention each other's incident. These differences are understandable, and indicate that project-based ambidexterity is both complicated to represent and a combination of the work of the actors within it. One 'single' view of this ambidexterity is an unrealistic expectation, and this richness further informs our understanding of the subject.

In contrast to the 'distributed' model, the alternative is when a single individual plays a key role in determining or influencing project-based exploitation and exploration. An example of this was Case 3 (an IT system for a major telecoms provider). Here the Project Manager was the primary contact with the customer and instrumental in working with them to determine technical and commercial solutions which were then implemented under conditions of change and uncertainty. His role was therefore important both in exploring new solutions and the route to implementation, and also in ensuring that the detailed work was performed as required. Interestingly, his exploratory work with the client meant that the subsequent tasks for others were actually better-defined and therefore more exploitative, and it could be argued that the higher-level exploration enabled the later, lower-level, exploitation. This is illustrated in Figure 4 where the Project Manager (D) plays a central part in the project and demonstrates ambidextrous HC, SC and PC (exhibiting both technical specialism and general management skills, working with a wide range of internal and external contacts and stakeholders, and driving and controlling the project while also working flexibly to accommodate the changing requirements of the client).

> "I think from my perspective I feel like I operate pretty much independently so I'll get a piece of work in, I'll quote for it… personally for me it's absolutely fundamental that what I say I'm going to deliver has been what I've drawn up, so I want to make sure I've got full control over that… It's pretty much an isolated experience so I'll work downwards with my team and across [customer], there's not really very much upwards." (Project Manager, Case 1).

The PMO Lead (E) and Programme Manager (F) played less important roles in this respect and did not demonstrate so much ambidexterity. Note that F was primarily concerned with mechanistic PC within the project to ensure compliance and control, but exhibited organic flexibility at the higher programme level, for example when resources needed rapid re-

allocation between projects due to urgent customer demands. Again, these are illustrative diagrams from the qualitative data but offer a distinctly different picture than the example given in Figure 3. This case offered an example where project-based ambidexterity could be attributed primarily to a single point, here the Project Manager.

INSERT FIGURE 4 ABOUT HERE

Because there were differing views and varying types of exploitation and exploration at the individual level in terms of intellectual capital (i.e. some individuals exhibited ambidexterity while others did not, although ambidexterity was identified when considered at the project level), this led to what we identified as 'distributed' and 'point' ambidexterity within the projects. We defined these as follows:

'Distributed Ambidexterity': The pattern of exploitative and exploratory actions among a group of individuals, the sum of which provides exploitation and exploration at the level of the group, organisation, project or work unit (Case 1).

'Point Ambidexterity': An individual who is a significant actor in creating group- or project-based ambidexterity, performing or coordinating both exploitative and exploratory actions that are not replicated by other individuals (Case 3).

Point ambidexterity implies that a single individual is central to ensuring the exploitation and exploration required to enable the delivery of the project's benefits.

> "I own the overall thing and I take the estimates that people produce, then I take [the customer's] decisions on when they want work doing and slot all that in…. I'll also decide normally who the technical lead is for each one." (Project Manager, Case 5)

In another case, the manager summed up his criticality with the telling phrase "I am a massive single point of failure, to be honest." Distributed ambidexterity is the opposite, where there is an acknowledgement of distinct roles.

> "The team are good, they do take that root cause approach of 'let's fix the incident' … For the most part they get on with it. I will raise questions but there's nothing been disastrous. I'll be talking to them saying, 'OK, tell me about it', and they say, 'Don't worry about it, it's all signed off'. It's generally very calm and well managed… I trust them, I let them do it. They can fix things much better than me, I'd be there to get in the way." (Delivery Manager, Case 2)

We observed from the eight cases that the relationship between the managers and their individual exploitative/exploratory actions also exhibited a tendency to *self-adjust* according to the other project participants. Individuals undertook tasks consistent not only with their personal ability and responsibility, but also in accordance with the others on the project. This is in line with von Krogh et al.'s (2012:254) idea of "intuitive working relations", although accommodating a dynamic element according to the evolving task environment. We note that these types of distributed and point ambidexterity are, then, theoretical 'end-points' on a continuum. Practical manifestations are in a 'grey area' and may move along the continuum over time in response to events. In terms of our research question, at these end points project-based ambidexterity may be mainly attributable to a single individual, or to a combination of individuals. This implies that the ability to 'manage' ambidexterity may be more discernible if it is dependent upon one person, whereas in a more distributed situation it becomes a group function and may be harder to oversee and orchestrate. This indicates that at these 'end-points' one type of ambidexterity is primarily enabled from an individual level, the other from a group level.

Managerial actions were therefore not just a function of the IC resources that he/she brought to the project, and their role, but were mediated by an understanding of the responsibilities and skills of others. In some instances this was explicit, when respondents described how they and their teams responded to issues, but it emerged as a wider theme within the cases. For example, in four of the cases the project managers left the bulk of the technical work to the technical managers and limited their own involvement in the detail. Had the technical manager been inadequate or absent, though, the project manager could have stepped into that role (based on their technical background and abilities), but he/she did not need to under the circumstances.

The relationship between self-adjustment, distributed ambidexterity and point ambidexterity is not straightforward, and the adjustment could incorporate significant dynamic effects. For instance, the project manager may take a more 'hands-off' approach to the technical side of the project in response to recognising the expertise of the technical manager, but then reconsider under critical incident conditions. Under these circumstances he/she may be required to coordinate and report more widely, thereby having to be involved in significant technical decision-making for the duration of the incident. In this example, the type can move from a distributed ambidexterity model to one where point ambidexterity from the Project Manager is significant (an example of this occurred in the government services case). The three concepts are linked and should not be considered as independent.

This is supported by the findings of Tushman et al. (2011) in their exploration of the role of the CEO in managing the tension between innovation and core products, as they identify two approaches to ambidexterity. First is the 'hub-and-spoke' model, where the CEO is central to decision-making and coordinating trade-off decisions between business unit heads and innovation leaders. The alternative is the 'ring model' which is a consensus-seeking group

comprising unit leaders that seek to balance the long- and short-term needs of the firm. In addition, we have identified the sub-components of the types of ambidexterity together with their associated resources.

### *Managerial Actions*

As discussed above, five managerial actions were identified in the data, and these will now be described.

With '*buffering'*, the manager evidently acted as a barrier to prevent unwarranted distractions affecting the team performing the tasks, and this was independently reported both by the managers describing their actions, and their staff highlighting the benefits of the 'protection' this offered. It was strongly evident in four of the cases. While attempting to prevent communication may appear counterintuitive, if the manager is the central point of contact, this can have two advantages. First, a coordinated and efficient approach to team knowledge-sharing can be implemented (e.g. the weekly project meeting). Second, this reduces the likelihood of team members being overwhelmed by task requests from the customer that may be at odds with the project plan. The result was that the team members were able to concentrate on their exploitative/exploratory tasks.

> "I think they also felt that they needed someone to look after them from the point of view of shielding them a little bit… not by trying to manage what they do or how they manage their time or anything like that but sort of a bit of a voice of reason to say 'you can't ask him to do that, he's too busy.'" (Programme Manager, Case 7)

There were examples where the manager deliberately overcame deficiencies by performing tasks that he/she knew were necessary but were not, for various reasons, being performed.

We termed this *'gap-filling'*. 'Gap-filling' was an unforeseen action, but one that was identified from the data. The project management role is that of ensuring delivery of all requirements, and it may be that the manager has the best overview of all the organisational processes that are required to be met. Technical staff may be focused on the particular technical solution and not be minded to follow this up with appropriate documentation or follow the review procedures, and so it can fall to the manager to ensure that the details are met. This is primarily an exploitative function that supports the wider knowledge-generation within the project, and was a finding from the interviews. It supported the attainment of ambidexterity by enabling staff to focus on the tasks for which they were most suited.

> "If you say to him, 'I think you need to get this 42-page document that you produced reviewed.' 'Why? Why should I?'… So you have to, you know, so you've got people like that who will say, 'Look, I'm not touching this at all, ever.' And you just let him get on with the work then and you do the processes… and then put a tick in the box." (Project Manager, Case 6)

The '*integration'* role was strongly evident from the cases. It consists of actively bringing together the knowledge within the project and its participants to create a coherent whole. One of the key functions of the manager is to bring together individuals (who may not be directly under his/her control) to achieve the project goals. In so doing, often disparate skills (such as software, hardware, finance and so forth) need to be harnessed for the delivery to be a success. This can also involve reconciling the customer requirements with the contractual obligations, since these may diverge over time. Integration is likely to involve both exploitation (for example, adherence to appropriate procedures) and exploration (ensuring that new problems are identified, shared and solved as a result). Meetings and regular communication to ensure alignment of the stakeholders, project staff and the overall objectives are important in enabling this integration. This is distinct from 'gap-filling' as

integration involves the combination of (potentially) multiple knowledge domains to achieve the goals, whereas 'gap-filling' is the completion of mostly non-critical tasks. Integration therefore supports the completion of the exploitative and exploratory tasks such that they contribute to the overall achievement of the desired benefits and requires a sufficient understanding of all aspects of the work.

> "…so now I am the only [customer] project manager. A kind of everything role." (Project Manager, Case 3)

Although integrating exploitative work to enable project-based exploitation is relatively clear-cut (for example, bringing together technical expertise to meet the performance requirements), this is not necessarily so straightforward for exploration. Exploration may actually be enabled through the actions of the project manager by bringing together more exploitative elements, as mentioned earlier. This was strongly evident in four cases, where the integration of technical expertise to achieve new goals was coordinated by the manager, who was the primary point of communication with the customer. Indeed, in the second telecoms case, the use of an 'agile' software team with staff not formally allocated to the project shows how the achievement of new goals can be met by breaking the tasks into smaller, exploitative work-packages undertaken by individuals unfamiliar with the 'bigger picture' of the project. It was therefore the manager's role to integrate this effort, and as such was broadly in line with the concept of structural ambidexterity. However, while the previous literature focuses on the structural separation of exploitation and exploration, coordinated by senior management, this raises an alternative possibility. Given the multitude of tasks that may be perceived as exploitative, the managerial role of integration may be where *exploration* can be understood as occurring, enabling project-based ambidexterity. This is a realistic assertion if one considers the project manager with a staff of technical experts. He or she is charged with delivering a novel project, using the work of staff who may exhibit more

exploitative HC, SC and PC. This is an alternative interpretation and extension of structural ambidexterity theory (O'Reilly and Tushman, 2004), in that individual managers may be central to the achievement of project-based exploration, and we have identified instances of this occurring. Integrating exploitative work to generate exploration is an interesting theoretical avenue to explore further.

*'Role-Expansion'* was identified primarily as a response to critical events when exploitation and exploration increased to deal with the situation. Under these circumstances the manager was required to do 'more' of what he or she normally did (communication, coordination, and so forth). A typical example would be when a major technical fault occurred, requiring imaginative fixes and significantly increased communication to stakeholders until the incident was resolved. This generally falls to the manager, who is perceived as the 'owner' of the problem. It could also incorporate problems that needed senior management support to resolve. However, these faults could be considered on a continuum with crises/critical incidents at one end, but also more minor (generally shorter-duration) 'events' that also require urgent attention (hence some of the 'role expansion' coding of the data was not associated with the critical incidents). The range of responses and solutions is limited by the organisational and customer constraints, although more options and resources may be made available under more difficult conditions.

> "It was like a more extreme example of the day-to-day stuff, a lot of stuff like getting people on site, getting responses back from various people in the change. There was always a problem and when you get a major incident then it becomes more critical to get those responses back so I guess just more focus on my part, jumping up and down a bit more, more aggressively trying to move things along." (Project Manager, Case 1)

The data provided little support that the response to critical incidents generally moved those work tasks from, for example, an exploitative to an exploratory mode. Instead, the data suggested that they were similar to the 'business-as-usual' operation, but far more intense. Examples would be the allocation of more resources simultaneously, reporting to senior management every few hours rather than weekly, and the application of trial technical solutions that previously would have been tested in a much slower timescale.

Finally, the role of the manager in setting the exploitative/exploratory ethos for the project also emerged from the data. We termed this *'tone-setting'*. This can be compared to the concept of contextual ambidexterity (Gibson and Birkinshaw, 2004), although at the micro-level a finer granularity could be studied. From these cases we saw that the manager could set the tone for the work, and this was mostly in ensuring a stronger adherence to the organisational procedures and/or adoption of beneficial techniques (more exploitative), but could also be in working with the customer to advocate flexibility. This was more than a function of leadership, and could also be co-created with the customer to identify the balance between exploitative and exploratory orientations such that a consistent, shared, ambidextrous approach was undertaken. This could involve a significant shift, as one manager commented:

> "Culturally, they are dinosaurs. But it's a legacy they've had and it has to change. The management within the team has to change. I'm just a newcomer with a completely different background." (Delivery Manager, Case 2)

These five actions are summarised in Table 3, together with example quotes.

INSERT TABLE 3 ABOUT HERE

**Identifying specific resources in relation to patterns of managerial actions**

As well as being identified individually, numerous combinations of the five actions were observed in the analysis, i.e. actions were coded as stand-alone, but could also be recognised in combination with other actions. Our coding data therefore included, for example, codes for 'integration' and also 'buffering + integration'. For 'buffering', 'integration', 'role expansion' and 'tone setting', the 'single-codes' accounted for around half of the coding occurrences, the other half being in combination with one or more other actions. For 'gap-filling', almost all the coding instances were single-code data points, i.e. not associated with another action. It is interesting that 'integration' was by far the most common occurrence in the coding, with more than twice as many instances as any of the other terms, potentially highlighting its relative importance.

As discussed, through parallel-coding the intellectual capital resources associated with the managerial actions were identified. For the five actions coded singly (e.g. 'buffering'), the co-occurring HC, SC and PC elements had a broadly similar number of coding instances. There were no clear links between a particular action and the dominance of any single IC code. Analysing the IC codes, coding instances of a single IC element (e.g. 'HC' or 'SC') versus those with multiple elements (e.g. 'HC+SC') occurred with approximately a 2:1 ratio, i.e. singly-coded actions were primarily associated with a single IC element (i.e. 'buffering' together with 'human capital').

We then analysed the instances in which multiple actions were coded (e.g. 'buffering' together with 'integration'), and noted some interesting observations in comparison with the 'single-coded' actions. Again, the relationships between the actions and the IC elements were

complicated, yet this time included approximately a 1:1 relationship between single or multiple IC element coding. The data indicated that the increase in utilisation of multiple intellectual capital resources is a response to the challenge of undertaking varied actions. We noted also that HC was more prevalent, with approximately twice the occurrences of either SC or PC, which were each of similar magnitude. This may indicate that the simultaneity of actions requires drawing on greater managerial skill, i.e. the individuals' human capital.

A key finding in this analysis was that of all the combinations of actions identified, all but one included 'integration'. This appears, then, to be the most significant of the actions, not only for its prevalence in the coding, but also for its interwoven nature with the other actions. We suggest that this is the 'spine' of the set of interrelated actions and that this integrating function may be the most important in generating project-based ambidexterity. We offer a visual representation of our finding in the framework of Figure 5. This combines the identification of the type of ambidexterity ('distributed' or 'point') which we place on a continuum in terms of the degree of 'centeredness' by which ambidexterity is expressed, and the five managerial actions. Each of these five can be identified within the data as a stand-alone action, but can also occur together with others. This is dynamic, responsive to the situational requirements and appropriate managerial judgement in the moment. This does not lead to a 'simple' model, yet in conveying the findings of the research to both scholars and also managers of the case organisation, the illustration of the concepts in the diagram does aid in the clarification of the ideas and assist in a discussion of how other projects operate.

INSERT FIGURE 5 ABOUT HERE

To summarise, few 'straightforward' patterns or IC arrangements emerged from the data. The actions can be considered independently of each other, and each can be identified separately in the data. Further analysis showed that the actions do not have consistent associations in

terms of intellectual capital resources. However, co-occurring actions are more likely to be coded with multiple IC elements, which may signify a higher level of complexity within the actions.

The evidence shows how difficult it is to disentangle the multiple aspects of ambidexterity, and that an understanding of their application requires a consideration of how they can, and do, interact. This holistic approach is required to comprehend project-based ambidexterity, and a reductionist approach, looking at the intellectual capital resource elements solely as separate pieces, is insufficient to appreciate the nature of their complex interplay. These findings contribute to our knowledge of the mechanisms enabling the attainment of ambidexterity. What emerges from our analysis is the importance of the judgement exercised by managers. Managerial actions are not only defined by the resources available but also by the ways managers choose to put these to use. Managerial judgement therefore, plays a critical part in how resources are deployed and to what effect, indicating the importance of human capital.

## Discussion and Conclusions

This work has revealed a far more detailed understanding of how contextual ambidexterity is enabled through the day-to-day actions of managers. The original case sampling process used project performance and an assessment of complexity based on the organisation's data in order to derive four quadrants via which to choose representative, ostensibly different, projects. The intention was to compare these cases to understand better the links between these aspects and ambidexterity. Interestingly, the responses within the cases were more similar than we expected from the original sampling data. Specific structural or socio-political complexities, such as a particular technical challenge that arose or a difficult client relationship, were common, and the case-to-case comparisons showed consistent approaches.

Similarly, our findings showed that critical events were reported frequently (although, as discussed, sometimes inconsistently between case respondents) and the duration of these could be shorter than the performance reporting cycles. Hence the overall performance metrics that we used for sampling were not necessarily a strong guide to the lived experience of the managers in the cases. From this we posit that managerial ambidexterity should be understood in the detail of the day-to-day tasks and responses, as well as the high-level theorisation within the literature, and that these may offer quite different perspectives. This research has highlighted that contextual ambidexterity in-the-moment is supported by the managerial actions identified, and that the nature of the particular challenges managers face may not be captured by organisational measures in place. This is important, as previous studies, although valuable, have not looked at this level of granularity, focusing primarily on organisational-level theorisation and empirical work. We have responded to the call by Turner et al. (2013) for studies to understand the role and orchestration of organisational assets, and that of O'Reilly and Tushman (2011) to articulate the managerial actions. In answering our research question of '*How is project-based ambidexterity enabled?'*, we have examined the micro-level of managerial action to provide greater insight for both scholars and managers. We built on the ambidexterity and project learning literatures and have contributed to both of these bodies of work.

This main contribution of this paper is the development of an empirically grounded theoretical framework of ambidexterity. We paid close attention to the space/locus within which ambidexterity occurs (i.e. the project) and to the managerial actions which combine various resources (i.e. human, social and project capital) to enable ambidexterity. Our IT-services-based case data allowed us to pinpoint (i) two distinct types of ambidexterity ('distributed' and 'point' ambidexterity), highlighting how project-based ambidexterity could be understood as being attributable to a number of participants with markedly different contributions, or just one; (ii) five managerial actions ('buffering', 'gap-filling', 'integration',

'role-expansion', and 'tone-setting') which are used to manage ambidexterity, as well as (iii) the complex utilisation of the associated intellectual capital resources (human, social and project capital) that support these actions. This interconnection between space – resources – patterns-of-action puts us in a unique position to further our understanding of ambidexterity. Previous research has looked at the organisational level of analysis. Brady and Davis (2004) show how more exploratory 'vanguard' projects can lead to project-to-project learning and then project-to-organisation learning. This involves trialling new solutions and formal learning mechanisms to institutionalise new routines and processes. At the project level reported here, though, the exploratory learning is more concentrated on solving issues within the project and so has a narrower emphasis, as reflected in the managerial actions.

Prominent themes in our data analysis were, first, the action of the manager as 'integrator', and second, the importance of the complex interplay between the co-occurring intellectual capital resources. The role of specialist and generalist HC shows which knowledge could usefully be in place to achieve this. In terms of SC, extensive communication is key to building and maintaining relationships amongst a range of stakeholders, and 'getting things done' can require both a formal and an informal approach to acquiring and disseminating project knowledge. Finally, the use of both (mechanistic) explicit tools and processes, together with the organic flexibility to respond to immediate issues provide the framework in which this can occur. Managers use these to weave together exploitation and exploration. In making such integration possible, we draw attention to the skills required on the part of the managers in this complex environment. This provides support for previous research findings of the value of intangible project management assets (e.g. Jugdev et al., 2007).

The temporal issue of ambidexterity and the requests for longitudinal studies (Jansen et al., 2006; Kristal et al., 2010; Turner et al., 2013) have been partially addressed here, also the issue of resource limitations (Lubatkin et al., 2006) is also found to be important. Similarly,

although these were not full longitudinal studies, the temporal element was inherent in the nature of the project work. Part of the research investigation was to seek evidence of the role of ambidexterity at the beginning/middle/end of the project and look for consistent themes across the projects studied. Interestingly, there were no strong or regular patterns among the cases. While temporal ambidexterity theory (Tushman and O'Reilly, 1996; Simsek et al., 2009) indicates that organisations can switch between exploitative and exploratory modes over time, there were no clear indications of these patterns occurring in the projects reported here. Equally, no consistent temporal themes could readily be discerned. This was unexpected, since it might be anticipated that a project would move from a more exploratory mode to a more exploitative one as the work progressed, however this was not evident from the data.

This research opens up a number of areas where further analysis is called for. First, the linkage between the identified actions and organisational outcomes can be explored in more detail. Quantitative analysis of a wide range of projects, identified elements of exploitation and exploration, specific managerial actions and a range of outcome measurements may lead to a greater understanding of the links between key actions and performance outcomes. Second, the role of complexity (Geraldi et al., 2011a) was useful both as a case sampling criterion and also in the interviews as a way of discussing project issues. The subject of how ambidexterity can be used as a response to organisational complexity may be a useful research avenue. Third, the work may be expanded to investigate further the benefits of ambidexterity in the judgements that underpin the actions managers take (see Antonacopoulou, 2008). Both exploitation and exploration have been identified, yet additional studies may identify examples of the mis-orchestration of ambidexterity (for example, too little/too much exploitation/exploration). This may best be examined in a full longitudinal analysis, where data is captured throughout the work along with the managerial perceptions at the time, allowing reflection after the event. Such a study would aid in the

understanding of knowledge refinement and knowledge creation in this context, and how decisions might have been improved in light of the outcome. Finally, by considering the details of the cases, the structural ambidexterity argument may be reconsidered. The role of the manager in these projects is to deliver the project outcomes, which generally involves some degree of novelty, yet this is often achieved using exploitative techniques and technologies. We can therefore consider that ambidexterity embodied within the manager may lead to effective exploration by the combination of exploitative elements. The management of more exploitative technical staff and existing solutions can generate novel outcomes, in the same way that standard materials may be used to build a radical building.

## References

Antonacopoulou, E.P., (2008). On the Practise of Practice: In-tensions and ex-tensions in the ongoing reconfiguration of practice. In D. Barry and H. Hansen (eds) *Handbook of New Approaches to Organization Studies***,** 112-131. London: Sage.

Arthur, M. B., DeFillippi, R. J. and Jones, C. (2001), "Project-based Learning as the Interplay of Career and Company Non-financial Capital", *Management Learning,* vol. 32, no. 1, pp. 99.

Ayas, K. and Zeniuk, N. (2001), "Project-based Learning: Building Communities of Reflective Practitioners", *Management Learning*, vol. 32, no. 1, pp. 61-77

Benner, M. J. and Tushman, M. L. (2003), "Exploitation, Exploration, and Process Management: the Productivity Dilemma Revisited", *Academy of Management Review,* vol. 28, no. 2, pp. 238-256.

Birkinshaw J. and Gupta K. (2013). "Clarifying the Distinctive Contribution of Ambidexterity to the Field of Organization Studies" *Academy of Management Perspectives* vol. 27, no. 4, pp 287-298.

Bontis, N. (1998), "Intellectual capital: An exploratory study that develops measures and models", *Management Decision,* vol. 36, no. 2, pp. 63.

Brady, T. and Davies, A. (2004), "Building Project Capabilities: From Exploratory to Exploitative Learning", *Organization Studies (01708406),* vol. 25, no. 9, pp. 1601-1621.

Brady, T., Davies, A. and Nightingale, P. (2012) "Dealing with uncertainty in complex projects: revisiting Klein and Meckling" *International Journal of Managing Projects in Business,* vol 5, no. 4, pp 661-679.

Burns, T. and Stalker, G. (1961), *The Management of Innovation.* Tavistock, London.

Burt, R. (1992), *Structural Holes: The Social Structure of Competition,* Harvard University Press, Cambridge, Massachusetts.

Cacciatori, E., Tamoschus, D. and Grabher, G. (2012), "Knowledge transfer across projects: Codification in creative, high-tech and engineering industries", *Management Learning,* vol. 43, no. 3, pp. 309-331.

Cao, Q., Gedajlovic, E. and Zhang, H. (2009), "Unpacking Organizational Ambidexterity: Dimensions, Contingencies, and Synergistic Effects", *Organization Science,* vol. 20, no. 4, pp. 781-796.

Cao, Q., Simsek, Z. and Zhang, H. (2010), "Modelling the Joint Impact of the CEO and the TMT on Organizational Ambidexterity", *Journal of Management Studies,* vol. 47, no. 7, pp. 1272-1296.

Chang, Y-Y. (2015) "A multilevel examination of high-performance work systems and unit-level organisational ambidexterity", Human Resource Management Journal vol. 25, no. 1, 79-101.

Daft, R. L. and Weick, K. E. (1984), "Toward a Model of Organizations as Interpretation Systems", *Academy of Management Review,* vol. 9, no. 2, pp. 284-295.

Davies, A., Brady, T. (2000) "Organisational capabilities and learning in complex product systems: towards repeatable solutions" *Research Policy* vol. 29 no. 7, pp 931–953.

Davies, A. and Hobday, M. (2005), *The Business of Projects,* Cambridge University Press, Cambridge.

Dutton C., Turner N. and Lee-Kelley L. (2014) "Learning in a Programme Context: An Exploratory Investigation of Drivers and Constraints." *International Journal of Project Management,* vol. 32 no. 5, pp719-892.

Eisenhardt, K. M. (1989), "Building Theories from Case Study Research", *Academy of Management Review,* vol. 14, no. 4, pp. 532-550.

Eisenhardt K. M. and Graebner M. E. "Theory Building from Cases: Opportunities and Challenges", Academy of Management Journal vol. 50, no. 1, pp 25-32.

Eisenhardt K. M. and Tabrizi B. N. (1995) "Accelerating Adaptive Processes: Product Innovation in the Global Computer Industry" *Administrative Science Quarterly*, vol. 40, no. 1, pp 84-110.

Enberg, C., Lindkvist, L., Tell, F., (2006) "Exploring the Dynamics of Knowledge Integration: Acting and Interacting in Project Teams", *Management Learning*, vol. 37 no. 2, pp. 143-165

Erhardt, N. (2011), "Is it all about teamwork? Understanding processes in team-based knowledge work", *Management Learning,* vol. 42, no. 1, pp. 87-112.

Felin, T. and Foss, N.J. (2005) Strategic Organization: A Field in Search of Micro-foundations. *Strategic Organization*, vol. 3 no. 4, pp 441-455.

Flanagan, J. G. (1954), "The Critical Incident Technique", *Psychological Bulletin,* vol. 1, pp. 327-358.

Garrick, J. and Clegg, S., (2001) "Stressed-out Knowledge Workers in Performative Times: A Postmodern Take on Project-based Learning", *Management Learning*, vol. 32, no., pp. 119-135.

Geraldi, J., Maylor, H. and Williams, T. (2011a), "Now let's make it really complex (complicated): a systematic review of the complexities of projects", *International Journal of Operations and Production Management,* vol. 31, no. 9, pp. 966-990.

Geraldi, J. G., Kutsch, E. and Turner, N. (2011b), "Towards a conceptualisation of quality in information technology projects", *International Journal of Project Management,* vol. 29, no. 5, pp. 557-567.

Gibson, C. B. and Birkinshaw, J. (2004), "The Antecedents, Consequences, and Mediating Role of Organizational Ambidexterity", *Academy of Management Journal,* vol. 47, no. 2, pp. 209-226.

Grabher, G. and Ibert, O. (2012) 'Project Ecologies: A Contextual View on Temporary Organizations' in Morris, P., Pinto, J. and Söderlund, J. (eds) '*The Oxford Handbook of Project Management*', Oxford, Oxford University Press, pp175-198.

Granovetter, M. (1973), "The Strength of Weak Ties", *American Journal of Sociology,* vol. 78, pp. 1360-1380.

Greve, H. R. (2013). "Microfoundations of Management: Behavioral Strategies and Levels of Rationality in Organizational Action. *Academy of Management Perspectives,* Vol. 27, no. 2, pp103-119.

Gulati, R., Nohria, N. and Zaheer, A. (2000), "Strategic Networks", *Strategic Management Journal,* vol. 21, no. 3, pp. 203.

Gupta, A. K., Smith, K. G. and Shalley, C. E. (2006), "The Interplay between Exploration and Exploitation", *Academy of Management Journal,* vol. 49, no. 4, pp. 693-706.

Hansen, M. T. (1999), "The Search-Transfer Problem: The Role of Weak Ties in Sharing Knowledge across Organization Subunits", *Administrative Science Quarterly,* vol. 44, no. 1, pp. 82-111.

He, Z. and Wong, P. (2004), "Exploration vs. Exploitation: An Empirical Test of the Ambidexterity Hypothesis", *Organization Science,* vol. 15, no. 4, pp. 481-494.

Hedberg, B. (1981), "How Organisations Learn and Unlearn", in Nystrom, P. C. and Starbuck, W. H. (eds.) *Handbook of Organisational Design,* Cambridge University Press, London, pp. 3.

Holmqvist, M. (2009), "Complicating the Organization: A New Prescription for the Learning Organization?", *Management Learning,* vol. 40, no. 3, pp. 275-287.

Hsu, L. and Wang, C. (2012), "Clarifying the Effect of Intellectual Capital on Performance: The Mediating Role of Dynamic Capability", *British Journal of Management,* vol. 23, no. 2, pp. 179-205.

Im, G. and Rai, A. (2008), "Knowledge Sharing Ambidexterity in Long-Term Interorganizational Relationships", *Management Science,* vol. 54, no. 7, pp. 1281-1296.

Jansen, J., Van den Bosch, F. and Volberda, H. W. (2006), "Exploratory Innovation, Exploitative Innovation, and Performance: Effects of Organizational Antecedents and Environmental Moderators", *Management Science,* vol. 52, no. 11, pp. 1661-1674.

Jansen, J., George, G., Van den Bosch, F. and Volberda, H. W. (2008), "Senior Team Attributes and Organizational Ambidexterity: The Moderating Role of Transformational Leadership", *Journal of Management Studies,* vol. 45, no. 5, pp. 982-1007.

Jugdev, K., Mathur, G. and Fung, T. S. (2007), "Project management assets and their relationship with the project management capability of the firm", *International Journal of Project Management,* vol. 25, no. 6, pp. 560-568.

Junni, P.; Sarala, R.M.; Taras, V.; Tarba, S.Y. (2013) "Organizational Ambidexterity and Performance: A Meta-Analysis" *Academy of Management Perspectives* vol. 27, no. 4, pp 299-312

Kang, S. and Snell, S. A. (2009), "Intellectual Capital Architectures and Ambidextrous Learning: A Framework for Human Resource Management", *Journal of Management Studies,* vol. 46, no. 1, pp. 65-92.

Katila, R. and Ahuja, G. (2002), "Something Old, Something New: a Longitudinal Study of Search Behavior and New Product Introduction", *Academy of Management Journal,* vol. 45, no. 6, pp. 1183-1194.

Kauppila, O., Rajala, R. and Jyrämä, A. (2011), "Knowledge sharing through virtual teams across borders and boundaries", *Management Learning,* vol. 42, no. 4, pp. 395-418.

Keegan, A. and Turner, J. R. (2001), "Quantity versus Quality in Project-based Learning Practices", *Management Learning*, vol. 32, no. 1, pp. 77-99.

Ketkar, S. and Sett, P. K. (2009), "HR flexibility and firm performance: analysis of a multi-level causal model", *International Journal of Human Resource Management*, vol. 20, no. 5, pp. 1009-1038.

King, N. (2004), "Using Templates in the Thematic Analysis of Text", in Cassell, C. and Symon, G. (eds.) *Essential Guide to Qualitative Methods in Organizational Research,* Sage, London, pp. 256-270.

Klein, B. and Meckling, W. (1958) "Application of Operations Research to Development Decisions" *Operations Research*, vol. 6, no. 3, pp 352-363.

Kogut, B. and Zander, U. (1996), "What Firms Do? Coordination, Identity, and Learning", *Organization Science,* vol. 7, no. 5, pp. 502-518.

Kristal, M. M., Huang, X. and Roth, A. V. (2010), "The effect of an ambidextrous supply chain strategy on combinative competitive capabilities and business performance", *Journal of Operations Management,* vol. 28, no. 5, pp. 415-429.

Kuckertz, A., Kohtamaki, M. and Droege gen. Korber, C., ( 2010), *The fast eat the slow - the impact of strategy and innovation timing on the success of technology-oriented ventures*.

Lenfle S. (2008), "Exploration and project management", *International Journal of Project Management*, vol. 26, no. 5, pp. 469-478.

Lenfle S. (2014), "Toward a genealogy of project management: Sidewinder and the management of exploratory projects", *International Journal of Project Management*, vol. 32, no. 6, pp. 921-931.

Lenfle, S. and Loch, C. (2010) "Lost Roots: How Project Management Came to Emphasise Control over Flexibility and Novelty" *California Management Review*. vol. 53, no. 1, pp 32-55

Li, C., Lin, C. and Chu, C. (2008), "The nature of market orientation and the ambidexterity of innovations", *Management Decision,* vol. 46, no. 7, pp. 1002-1026.

Lindkvist, L. (2012) 'Knowledge Integration in Product Development Projects, A Contingency Framework' in Morris, P., Pinto, J. and Söderlund, J. (eds) '*The Oxford Handbook of Project Management*', Oxford, Oxford University Press, pp 463-482.

Lubatkin, M. H., Simsek, Z., Ling, Y. and Veiga, J. F. (2006), "Ambidexterity and Performance in Small- to Medium-Sized Firms: The Pivotal Role of Top Management Team Behavioral Integration", *Journal of Management,* vol. 32, no. 5, pp. 646-672.

March, J. G. (1991), "Exploration and Exploitation in Organizational Learning", *Organization Science,* vol. 2, no. 1, pp. 71-87.

Maylor, H., Brady, T., Cooke-Davies, T. and Hodgson, D. (2006), "From projectification to programmification", *International Journal of Project Management,* vol. 24, no. 8, pp. 663-674.

Maylor H., Turner N., and Murray-Webster R. (2013) "How Hard Can It Be? Actively Managing Complexity in Technology Projects" *Research Technology Management,* vol. 56, no. 4, pp 45-51.

Midler C. and Beaume R. (2010) "Project-based learning patterns for dominant design renewal: The case of Electric Vehicle" *International Journal of Project Management*, vol. 28, no. 2, pp 142-150.

Miles, M. and Huberman, A. M. (1994), *Qualitative Data Analysis,* Sage, London.

Mom, T. J. M., Van den Bosch, F. and Volberda, H. W. (2007), "Investigating Managers' Exploration and Exploitation Activities: The Influence of Top-Down, Bottom-Up, and Horizontal Knowledge Inflows", *Journal of Management Studies,* vol. 44, no. 6, pp. 910-931.

Mom, T. J. M., Van den Bosch, F. and Volberda, H. W. (2009), "Understanding Variation in Managers' Ambidexterity: Investigating Direct and Interaction Effects of Formal

Structural and Personal Coordination Mechanisms", *Organization Science,* vol. 20, no. 4, pp. 812-828.

Morgan, R. E. and Berthon, P. (2008), "Market Orientation, Generative Learning, Innovation Strategy and Business Performance Inter-Relationships in Bioscience Firms", *Journal of Management Studies,* vol. 45, no. 8, pp. 1329-1353.

Nemanich, L. A. and Vera, D. (2009), "Transformational leadership and ambidexterity in the context of an acquisition", *Leadership Quarterly,* vol. 20, no. 1, pp. 19-33.

Newell, S., Bresnen, M., Edelman, L., Scarbrough, H. and Swan, J. (2006), "Sharing Knowledge Across Projects: Limits to ICT-led Project Review Practices", *Management Learning*, vol. 37, no. 2, pp. 167-185.

O'Reilly, C. A. and Tushman, M. L. (2004), "The Ambidextrous Organization", *Harvard Business Review,* vol. 82, no. 4, pp. 74-81.

O'Reilly, C. A. and Tushman, M. L. (2011), "Organizational Ambidexterity in Action: How Managers Explore and Exploit", *California management review,* vol. 53, no. 4, pp. 5-22.

O Reilly, C.A.; Tushman, M. L. (2013) "Organizational Ambidexterity: Past, Present, and Future" *Academy of Management Perspectives,* vol 27, no. 4, pp 324-338.

Pellegrinelli S., Murray-Webster R. and Turner N. (2015) "Facilitating Structural Ambidexterity through the Complementary Use of Programmes and Projects" *International Journal of Project Management* 33 (1) 153-164.

Raisch, S. and Birkinshaw, J. (2008), "Organizational Ambidexterity: Antecedents, Outcomes, and Moderators", *Journal of Management,* vol. 34, no. 3, pp. 375-409.

Reagans, R. and McEvily, B. (2003), "Network Structure and Knowledge Transfer: The Effects of Cohesion and Range", *Administrative Science Quarterly,* vol. 48, no. 2, pp. 240-267.

Reed, K. K., Lubatkin, M. and Srinivasan, N. (2006), "Proposing and Testing an Intellectual Capital-Based View of the Firm", *Journal of Management Studies,* vol. 43, no. 4, pp. 867-893.

Saldaña, J. (2009), *The Coding Manual for Qualitative Researchers,* Sage, London.

Scarbrough, H., Bresnen, M., Edelman, L. F., Laurent, S., Newell, S. and Swan, J. (2004a), "The Processes of Project-based Learning", *Management Learning*, vol. 35, no. 4, pp. 491-506.

Simon, H. A. (1991), "Bounded Rationality and Organizational Learning", *Organization Science,* vol. 2, no. 1, pp. 125-134.

Simsek, Z. (2009), "Organizational Ambidexterity: Towards a Multilevel Understanding", *Journal of Management Studies,* vol. 46, no. 4, pp. 597-624.

Simsek, Z., Heavey, C., Veiga, J. F. and Souder, D. (2009), "A Typology for Aligning Organizational Ambidexterity's Conceptualizations, Antecedents, and Outcomes", *Journal of Management Studies,* vol. 46, no. 5, pp. 864-894.

Smith, P.A.C., (2001) “Action Learning and Reflective Practice in Project Environments that are Related to Leadership Development”, *Management Learning*, vol. 32 no. 1, pp. 31-49

Söderlund, J. (2011), "Pluralism in Project Management: Navigating the Crossroads of Specialization and Fragmentation", *International Journal of Management Reviews,* vol. 13, no. 2, pp. 153-176.

Stake, R. E. (2006) "Qualitative Case Studies", in Denzin N. K. and Lincoln Y. S. (eds) *Sage Handbook of Qualitative Research*, 3rd edition, Thousand Oaks, CA, Sage, pp 443-66

Swan, J., Scarbrough, H. and Newell, S. (2010), "Why don't (or do) organizations learn from projects?", *Management Learning*, vol. 41, no. 3, pp. 325-344.

Swart, J. (2006), "Intellectual capital: disentangling an enigmatic concept", *Journal of Intellectual Capital,* vol. 7, no. 2, pp. 136.

Swart, J. and Kinnie, N. (2007), "Simultaneity of Learning Orientations in a Marketing Agency", *Management Learning,* vol. 38, no. 3, pp. 337-357.

Tiwana, A. (2008), "Do bridging ties complement strong ties? An empirical examination of alliance ambidexterity", *Strategic Management Journal,* vol. 29, no. 3, pp. 251-272.

Turner, N. and Lee-Kelley, L. (2013), "Unpacking the theory on ambidexterity: An illustrative case on the managerial architectures, mechanisms and dynamics", *Management Learning,* vol. 44, no. 2, pp. 179-196.

Turner, N., Swart, J. and Maylor, H. (2013), "Mechanisms for Managing Ambidexterity: A Review and Research Agenda", *International Journal of Management Reviews,* vol. 15, no. 3, pp. 317-332.

Turner, R and Cochrane R. (1993), "Goals-and-methods matrix: coping with projects with ill defined goals and/or methods of achieving them", *International Journal of Project Management*, vol. 11, no. 2, pp. 93-102.

Tushman, M. L. and O'Reilly, C. A. (1996), "Ambidextrous Organizations: Managing Evolutionary and Revolutionary Change", *California Management Review,* vol. 38, no. 4, pp. 8-30.

Tushman, M. L., Smith, W. K. and Binns, A. (2011), "The Ambidextrous CEO", *Harvard Business Review,* vol. 89, no. 6, pp. 74-80.

Uzzi, B. (1997), "Social Structure and Competition in Interfirm Networks: The Paradox of Embeddedness", *Administrative Science Quarterly,* vol. 42, no. 1, pp. 35-67.

von Krogh, G., Nonaka, I. and Rechsteiner, L. (2012), "Leadership in Organizational Knowledge Creation: A Review and Framework", *Journal of Management Studies,* vol. 49, no. 1, pp. 240-277.

Yin, R. (2009), *Case Study Research, Design and Methods, Fourth Edition*, Thousand Oaks, CA, Sage.

Youndt, M. A., Subramaniam, M. and Snell, S. A. (2004), "Intellectual Capital Profiles: An Examination of Investments and Returns", *Journal of Management Studies,* vol. 41, no. 2, pp. 335-361.